

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0307

Roll No.

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B. Tech.

(SEM. VII) ODD SEMESTER THEORY
EXAMINATION 2010-11

FUNDAMENTALS OF RADAR AND NAVIGATION

Time : 3 Hours

Total Marks : 100

Note :—Attempt all questions.

1. Attempt any two of the following :— (10×2=20)

- (a) What do you understand by Radar signal models ? Obtain the expression for simple point target radar range equation.

Consider an X-band (10 GHz) radar with a peak transmitted power of 1 KW and a pencil beam antenna with a 1° beam-width, and suppose an echo is received from a jumbo jet aircraft with an RCS of 100 m^2 at a range of 10 km. The antenna gain is 26,000. Calculate the received power assuming atmospheric and system losses are negligible.

- (b) Define signal to noise ratio in the noise model.

- (c) Write short notes on :—

- (i) Swirling model
(ii) Clutter and Signal to Clutter Ratio (SCR).

2. Attempt any two of the following :— (10×2=20)

- (a) What is Doppler shift and explain the simplified approach to Doppler shift.

- (b) Define matched filter. Explain matched filtering of moving targets.
- (c) Define the following :—
- Radar Ambiguity function
 - Matched filter for the Pulse Burst waveform.
3. Attempt any **two** of the following :— (10×2=20)
- What are different detection theories ? Explain them in brief.
 - Describe the Radar detection as hypothesis testing.
 - Define Albersheim's and Schidman's equation.
4. Attempt any **two** of the following :— (10×2=20)
- Explain the working of DME system with the help of block diagram. Explain briefly the characteristic features of the DME system.
 - Define VOR. Explain the purpose of VOR and its uses, also explain the principle of operation.
 - Define the following :—
 - Block diagram of Basic Decca receiver.
 - Modes of operation in omega system.
5. Write short notes on any **two** of the following :— (10×2=20)
- NAVSTAR system
 - MLS (Microwave Landing System)
 - GPS.